

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
19 August 2004 (19.08.2004)

PCT

(10) International Publication Number
WO 2004/069495 A1

(51) International Patent Classification⁷: **B26B 21/22**

(21) International Application Number:
PCT/US2004/002192

(22) International Filing Date: 27 January 2004 (27.01.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/442,990 28 January 2003 (28.01.2003) US

(71) Applicant: EVEREADY BATTERY COMPANY, INC.
[US/US]; 25225 Detroit Road, P.O. Box 45077, Westlake,
OH 44145 (US).

(72) Inventors: LEMBKE, Max, Arthur; 60 Jubilee Road,
Perivale, Middlesex, UB67H2 (GB). THONE, Jochen;
Erbschloerstrasse 67, D-42369 Wuppertal (DE). FIS-
CHER, S; Hundeicken Str.1, D-58285 Gevelsberg (DE).
BYKOWSKI, Henry; Steubenstr. 14, D-42699 Soligen
(DE).

(74) Agents: MICHAUD, Richard, R. et al.; McCormick,
Paulding & Huber L.L.P., Cityplace II, 185 Asylum Street,
Hartford, CT 06103-3402 (US).

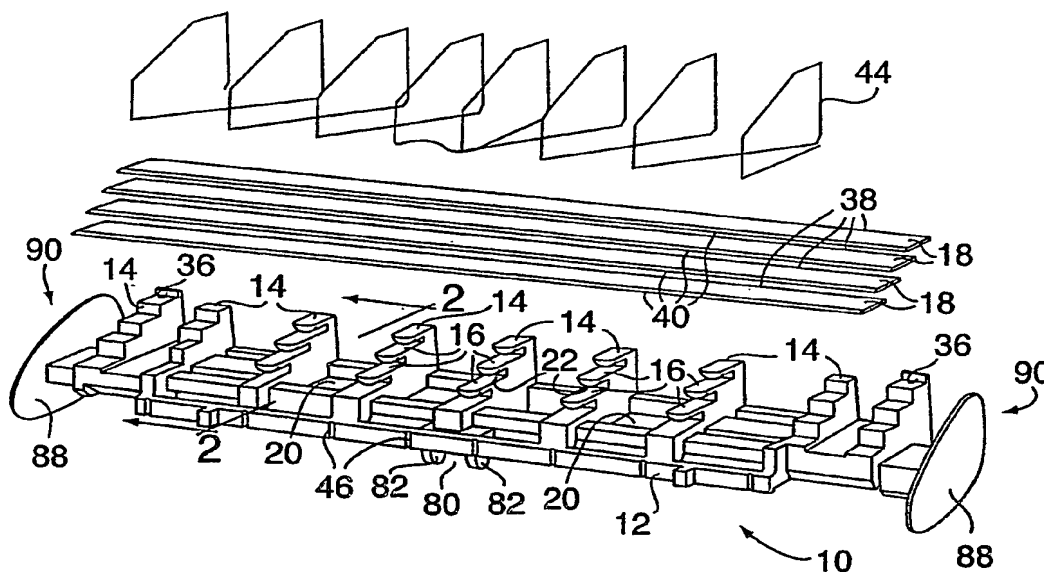
(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), Euro-
pean (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR,
GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

Published:
— with international search report

[Continued on next page]

(54) Title: RAZOR BLADE PLATFORM AND RAZOR CARTRIDGE USING SAME



(57) Abstract: The present invention is a razor blade carrier having a base (12) with at least two stepped protrusion extending outwardly therefrom. The stepped protrusion defines at least two landing positions that support a portion of the razor blade. The landing surfaces of the stepped protrusions cooperate to define at least two razor blade locations. The razor blade carrier is used in a razor cartridge.

WO 2004/069495 A1



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

RAZOR BLADE PLATFORM AND RAZOR CARTRIDGE USING SAME

Cross-Reference to Related Applications

This application is entitled to the benefit of and incorporates by
5 reference essential subject matter disclosed in Provisional Patent Application No.
60/442,990 filed on January 28, 2003.

Field of the Invention

The invention relates generally to shaving implements for use on
10 hirsute surfaces and more specifically to a device for supporting razor blades
forming part of a razor cartridge.

Background of the Invention

Modern safety razors typically include a razor cartridge that supports
15 at least one razor blade for removing hair from hirsute surfaces during a shaving
operation. These razor cartridges typically incorporate two or more razor blades to
allow for greater hair removal in a single pass of the razor.

The positioning of multiple razor blades within a small, often
disposable razor cartridge, can be complex. For example, to ensure an acceptably
20 close shave and to minimize the potential for cutting, abrading, or nicking the skin,
or uncomfortably pulling the hair during a shaving operation the orientation of the
razor blades in a multi-blade razor cartridge is important. A problem associated
with prior art razor cartridges concerns the difficulties associated with establishing
and maintaining a desired blade alignment and orientation. This is due in part to
25 the fact that the razor cartridge consists of a multiplicity of parts including spacers.
Each of these parts has associated with it an acceptable tolerance range. When
assembled these tolerance ranges can sometimes become additive thereby resulting
in a less than desirable alignment of the razor blades. In addition, due to the
miniature nature of the parts that comprise the razor cartridge, difficulties in
30 assembly can further misorient components. As a result of the multiple parts,
manufacturing is expensive with quality control being problematic.

In addition, the multiple parts cause undesirable blockages within the
razor cartridge. In a wet shaving operation wherein a shaving aid, such as a cream
or gel is employed, debris, such as hair and shaving cream, may become lodged
35 within the multi-blade razor cartridge between the razor blades. The debris is

customarily removed from the multi-blade razor cartridge by flushing with water, however, blockages due to the positioning of features and components in the cartridge can make removal of the debris difficult or impossible. In extreme cases, blockages can cause a buildup of debris within the cartridge that alters the spacing
5 between the blades or causes the development of surfaces that prevent the skin from properly engaging the blades leading to a shaving outcome that is less than optimum.

Based on the foregoing, it is an object of the present invention to improve upon or overcome the problems associated with prior art razors and
10 cartridges.

Summary of the Invention

The present invention is directed in one aspect to a razor blade platform that includes a base portion having at least two projections extending
15 therefrom. Each projection defines at least a pair of approximately parallel spaced apart support surfaces. Each of the support surfaces on one of the projections is approximately laterally aligned with a corresponding support surface defined by the other projection and is adapted to carry a portion of a razor blade.

In an embodiment of the present invention, the razor blade platform
20 includes a plurality of projections, a portion of which define slots that are open at one end with one of the above-described support surfaces partially defining each slot. A portion of a razor blade to be mounted onto the blade platform, is slidably received within each slot and engages an abutment surface forming part of the slot portion of a rear edge defined by each razor blade to be mounted to the blade
25 thereby ensuring proper alignment of the razor blade relative to the blade platform. Preferably, the blade platform is formed from a single piece of polymeric material and defines at least one aperture extending therethrough to allow shaving debris to be washed from the blade platform.

The present invention also resides in a second aspect to a razor
30 cartridge that includes a first cover that defines an opening and is adapted to overlie the above-described razor blade platform. The razor blade platform has at least two razor blades mounted thereon so that at least a portion of the cutting edges of the razor blades is positioned within the first cover opening and thereby exposed. A second cover is coupled to the first cover and together they cooperate
35 to define an interior area in which the blade platform is located.

In one embodiment, a thin wire is wrapped around the razor cartridge and over the opening defined by the first cover. The wrapped wire extends across the opening transversely of the cutting edges to minimize the potential for skin to extrude between the razor blades during a shaving operation.

5 In addition, the second cover preferably defines an aperture that cooperates with any apertures or passages in the blade platform to allow shaving debris to be washed from the razor cartridge.

The present invention resides in yet another aspect, in a method for loading razor blades into a blade platform for use in a razor cartridge.

10 Initially, a blade platform is provided that defines at least two support surfaces each adapted to carry a portion of a razor blade. A blade support is also provided and defines at least two mating support surfaces positioned to be approximately coincident with the support surfaces defined by the blade platform when the blade platform and the blade support are moved into proximity with one another. The
15 blade support also includes means for releasably retaining at least two razor blades thereon. At least two razor blades are releasably mounted to the blade support which is then moved into proximity with the blade platform so that a portion of the razor blades engage the support surfaces defined by the blade platform. The razor blades are then adhered to the blade platform and at least one of the blade support
20 and the blade platform is moved away from the other of the blade support and the blade platform so that the razor blades remain adhered to the blade platform.

In another embodiment of the method of the present invention, the razor blades are mounted onto a retainer so that they can be rotatably, or angularly, moved into position on the razor blade platform.

25

Brief Description of the Drawings

FIG. 1 is an exploded perspective view illustrating a razor blade platform of the present invention along with razor blades and a wire wrap to be supported by the razor blade platform.

30 FIG. 2 is a cross sectional view of the razor blade platform of FIG. 1 taken along line 2-2.

FIG. 3 is a partial sectional view of an alternative embodiment of the razor blade platform of FIG. 1 taken along line 2-2.

35 FIG. 4 is a bottom view of a razor cartridge that employs the razor blade platform of FIG. 1.

FIG. 5 is a rear view of a razor cartridge employing the razor blade platform of FIG. 1.

FIG. 6 is a side view of a razor cartridge employing the razor blade platform of FIG. 1.

5 FIG. 7 is a front view of a razor cartridge employing the razor blade platform of FIG. 1.

FIG. 8 is a top view of a razor cartridge employing the razor blade platform of FIG. 1.

10 FIG. 9 is an exploded perspective view of a razor cartridge employing the razor blade platform of FIG. 1.

FIG. 10 schematically illustrates a method for mounting razor blades to a razor blade platform of the present invention.

FIG. 11 schematically illustrates another embodiment of a method for mounting razor blades to a razor blade platform of the present invention.

15

Detailed Description of the Preferred Embodiments

As shown in FIG. 1, a razor blade platform embodying the present invention and generally denoted by the reference number 10, includes a base portion 12 having a plurality of projections 14 extending outwardly therefrom.

20 Each projection 14 defines at least a pair of spaced apart, and in the illustrated embodiment, stepped, support surfaces 16. Each projection 14 has four approximately parallel support surfaces 16. Each support surface 16 on one of the projections 14 being approximately laterally aligned with a corresponding support surface on the next successive projection. Each of the support surfaces 16 is
25 adapted to support a portion of a razor blade 18, so that the razor blade extends across, and is carried by the approximately laterally aligned support surfaces. As shown in FIG. 1, the razor blade platform 10 is adapted to carry four razor blades 18. However, the present invention is not limited in this regard as the razor blade platform 10 can be configured to carry more than, or less than four razor blades 18.

30 In the preferred embodiment of the present invention, the razor blade platform 10 is formed from, or into a single piece of, preferably polymeric, material. The razor blade platform 10 can also be made by injection molding. However, the present invention is not limited in this regard as the razor blade platform can be made from different materials, such as metals or elastomers.

The base portion 12 has passages 20 therein to allow for the removal of debris, such as skin, hair, and shaving aid, that can become lodged between the razor blades 18 and/or between the razor blades 18 and the base portion 12 during a shaving operation.

5 There may be any number of support surfaces 16 on a projection 14. These support surfaces 16 can be equally spaced or not. In some cases, some of the support surfaces 16 could be equally spaced and others not. In addition, the area defined by each of the support surfaces 16 may vary. The support surfaces 16 are not necessarily planar and may be undulating or have troughs, such an
10 embodiment is illustrated in FIG. 3.

Referring to FIG. 2, a portion of the plurality of projections 14 include slots 22, open at one end and defined in-part by one of the support surfaces 16. As shown, an overhanging portion 24, a surface of which defines a support surface 16 can also be established with a surface 26 generally opposite the support surface 16
15 acting to define in-part one of the slots 22. Depending upon the design of a shaving implement employing the razor blade platform 10, the overhang portion 24 can include a distal end 28 positioned such that skin does not extrude too far into an interstitial space 30 between the razor blades 18 during a shaving operation. The distal end 28 could also have, if desired, a chamfer 32 creating a larger opening 34
20 into the slot 22.

In addition to the above-described support surfaces 16, the projections 14 also define abutment surfaces 36 that provide for alignment of the razor blades 18 when positioned on the razor blade platform 10. Accordingly, when a razor blade 18 is mounted onto the razor blade platform 10, a surface 38 of the razor
25 blade generally opposite the cutting edge 40, defined by the razor blade 18, engages the abutment surface 36, thereby aligning the razor blade relative to the razor blade platform 10.

Still referring to FIG. 2, the slot 22 can be of any shape. Depending upon the shape, the slot 22 could frictionally retain the razor blade 18 against the
30 support surface 16. An alternative slot design is shown in FIG. 3. In this design, the overhang portion 24 has an undersurface 42 that is angled relative to the support surface 16 over which the overhang portion 24 projects such that the razor blade 18 is not held against the support surface 16 by the overhang portion 24.

Referring back to FIG. 1, a razor blade 18 is preferably attached to
35 each laterally aligned support surface 16 of the razor blade platform 10. The

support surfaces 16 provide the contour, if any, to the razor blade 18. In the preferred embodiment, the support surfaces 16 define a contour that is generally planar, but this should not be a limitation of the invention as any contour could be defined such as a fair curve but the contour could be unfair if desired. Attachment
5 of the razor blade 18 to a support surface 16 can be by any meanings including adhesive or mechanical fastener.

Multiple configurations of the projection 14 are possible. In the embodiment depicted in FIG. 1, two configurations of the projections 14 are shown wherein some of the projections 14 define slots 22 while others do not.
10 While a particular number of slotted and unslotted projections has been shown, the present invention is not limited in this regard as any number of projections and combinations of slotted and unslotted projections can be employed without departing from the broader aspects of the present invention.

A protective covering 44, shown in the illustrated embodiment as a
15 thin length of wire is wrapped around the razor blade platform 10 and extends over the cutting edges 40 of the razor blades 18 mounted thereon. The wire 44 is provided to prevent a user's skin from excessively extruding between the razor blades 18. In order to properly orient the wire 44, relative to the razor blade platform 10, the wire 44, is positioned in slots 46 located in the base portion 12.
20 However, the present invention is not limited in this regard as the wire 44 can be simply wrapped around the razor blade platform 10. Preferably, the wire 44 is metal, however other materials, such as, but not limited to, polymeric strands can be substituted without departing from the broader aspects of the present invention.

As shown in FIGS. 4 through 9, the razor blade platform 10 is
25 integrated into a razor cartridge, generally designated by the reference number 48. The razor cartridge 48 has a first cover 50 that securely mates with a second cover 52. The first and second covers, 50 and 52 respectively, cooperate to define an interior area 54 into which the razor blade platform 10 is located. The first cover 50 has an opening 56 positioned relative to the razor blade platform 10 so that at least
30 a portion of the cutting edges 46 of the razor blades 18 mounted on the razor blade platform 10 are exposed. In addition, the second cover 52 includes at least one opening 58 that cooperates with the passages 20 to allow debris accumulated during a shaving operation to be washed through the passages 20 and the opening 58 in the second cover 52.

The first cover 50 has protrusions 60 that extend outwardly from an interior surface 62. The protrusions 60 rest on one of the razor blades 18. The first cover 50 includes a leading edge 64 that defines recesses 66 that are aligned with the slots 46 on the razor blade platform 10. As stated above, the wire 44 engages the slots 46 as it is wrapped around the razor blade platform 10 and the razor blades 18 mounted thereon. The recesses 66 are sized based upon the size of the protective covering 44 such that there is a smooth transition for the skin from the leading edge 64 onto the protective covering 44.

The first cover 50 also includes a lubricious strip of material 68, preferably impregnated with a shaving aid. The lubricious strip 68 is positioned within a pocket 70 defined by the first cover 50 such that during a shaving operation, the user's skin engages the lubricious strip 68 prior to the skin engaging the cutting edge 40 of the razor blades 18. A second lubricious strip 72, also preferably impregnated with a shaving aid is located on an outer surface 74 of the first cover 50. Extending outwardly from an inner surface 76 of the second cover 52 is a tab 78 positioned to engage a slot 80 in the razor cartridge 48 defined by lobes 82 on the base portion 12 of the razor blade platform 10. The tabs 78 and slot 80 prevent longitudinal movement of the razor blade platform 10 relative to the first and second covers 50 and 52, respectively.

The razor blade platform 10 is mounted on the second cover 52 by placing opposed extensions 84 onto opposed bearing surfaces 86. In this embodiment, the extensions 84 are curved to match the contour of the bearing surfaces 86. This permits the razor blade platform 10 to roll in the second cover 52. A flange 88 on each distal end 90 of the extensions 84 further limit longitudinal movement of the razor blade platform 10.

The first cover 50 mates with the second cover 52 positioning the razor blade platform 10 within the razor cartridge 48. The first cover 50 has apertures 92 that are sized to permit the first cover to be positionable over the extensions 84. When assembled, the flanges 88 are located adjacent opposed outer surfaces 94 of the razor cartridge. A spring 96 is positioned in the interior area of the razor cartridge 48 between the second cover 52 and razor blade platform 10 to normally bias the razor blade platform 10 toward the first cover 50 and assist in positioning at least a portion of the cutting edges 40 within the opening 56.

The present invention also resides in a method for mounting the above-described razor blades 18 to the razor blade platform 10. As shown in FIG.

10, in an embodiment of the method, the razor blades 18 are mounted onto a blade support 98 defining support surfaces 100 oriented so as to be approximately coincident with the support surfaces 16 of the razor blade platform 10, when the blade support 98 and the razor blade platform 10 are brought into proximity with one another. The blade support 98 defines slots 102 adapted to releasably receive and retain at least a portion of the cutting edges 40 defined by the razor blades 18. Adhesive 104 is then applied to an outwardly facing surface 106 of each razor blade 18 releasably retained by the blade support 98. The adhesive 104 is applied on areal portions of each razor blade 18 that will engage the support surfaces 16 defined by the projection 14. The blade support 98 and the razor blade platform 10 are then brought into proximity with one another so that the outwardly facing surfaces 106 of the razor blades 18 engage the support surfaces 16 of the blade support 98. The adhesive 104 is then allowed to cure so that when the blade support 98 is moved away from the razor blade platform 10, the razor blades 18 release from the blade support 98 and remain bonded to the razor blade platform 10. While slots 102 on the blade support 98 have been shown and described as the mechanism by which the cutting edges 40 of the razor blade 18 are retained, the present invention is not limited in this regard as other manners of releasably retaining the razor blades 18 on the blade support 98 can be employed. For example, suction or clamps can be employed without departing from the broader aspects of the present invention.

In another method as shown schematically in FIG. 11, the razor blades 18 are each mounted to a retainer 108 and rotatably brought into engagement with the razor blade platform 10.

Although the present invention has been described in considerable detail with reference to certain preferred versions thereof, other versions are possible. Therefore, the spirit and scope of the invention should not be limited to the description of the preferred versions contained herein

What is claimed is:

1. A razor blade platform comprising:
a base portion;
at least two projections extending from said base portion, each
defining at least a pair of approximately parallel spaced apart support surfaces;
5 each of said support surfaces on one of said projections being
approximately laterally aligned with a corresponding one of said support surfaces
defined by the other of said projections; and wherein
each of said support surfaces is adapted to carry a portion of a razor
blade extending along said razor blade platform.
2. A razor blade platform as defined by claim 1, wherein:
at least one of said projections includes a slot, open at one end and
defined in-part by one of said support surfaces; and wherein said portion of said
razor blade is slidably received in said slot.
3. A razor blade platform as defined by claim 2, wherein:
said at least two projections include at least three projections, one
positioned adjacent each end of said base portion, and the third projection located
therebetween; and wherein said slot is defined by said third projection.
4. A razor blade platform as defined by claim 1 wherein:
said at least two projections include a plurality of
projections extending from said base portion, longitudinally thereof, each
projection being spaced-apart from the next successive projection; and wherein
5 each of said support surfaces is approximately aligned with a
corresponding support surface defined by the next successive projection.
5. A razor blade platform as defined by claim 4 wherein at least a
portion of said plurality of projections define at least one slot, open at one end and
defined in-part by one of said support surfaces; and wherein said portion of said
razor blade is slidably received in said slot.

6. A razor blade platform as defined by claim 1 wherein said at least two projections each define a plurality of support surfaces.

7. A razor blade platform as defined by claim 5 wherein:
said plurality of projections each define a plurality of support surfaces.

8. A razor blade platform as defined by claim 1 wherein said razor blade platform is unitary and formed from a single piece of material.

9. A razor blade platform as defined by claim 8 wherein said razor blade platform is formed from plastic.

10. A razor blade platform as defined by claim 9 wherein said razor blade platform is injection molded into a single unitary part.

11. A razor blade platform as defined by claim 5 wherein:
said razor blade platform includes generally opposite first and second ends; and
said projections proximate said first and second ends do not define
5 slots.

12. A razor blade platform as defined by claim 11 wherein two successive projections proximate each of said first and second ends do not define slots with the remainder of said plurality of projections each defining at least one slot.

13. A razor blade platform as defined by claim 12 wherein:
each of said projections defines three support surfaces; and
said projections that define at least one slot, each define two slots.

14. A razor blade platform as defined by claim 12 wherein:
each of said projections defines four support surfaces; and
said projections that define at least one slot, each define three slots.

15. A razor blade platform as defined by claim 1 wherein:
said base portion defines generally opposite first and second ends;
and
a flange is coupled to each of said first and second ends.
16. A razor blade platform as defined by claim 15 wherein said razor blade platform is unitary and formed from a single piece of material.
17. A razor blade platform as defined by claim 1 wherein said base portion defines at least one aperture extending therethrough to allow shaving debris to be washed from said razor blade platform through said aperture during a shaving operation.
18. A razor cartridge comprising:
a first cover defining an opening;
a razor blade platform having;
a base portion;
at least two projections extending from said base portion each
5 defining at least a pair of approximately parallel spaced apart support surfaces;
each of said support surfaces on one of said projections being
approximately laterally aligned with a corresponding one of said support surfaces
defined by the other of said projections;
10 at least two razor blades, each being carried by at least two of said
laterally aligned support surfaces; and
said razor blade platform being coupled to said first cover with said
opening being positioned over said razor blades so that at least a portion of cutting
edges defined thereby are exposed.
19. A razor cartridge as defined by claim 18 wherein said razor blade platform is unitary.
20. A razor cartridge as defined by claim 19 wherein said razor blade platform is a single molded piece of polymeric material.

21. A razor cartridge as defined by claim 18 further comprising a wire wrapped around said razor cartridge and extending over said portions of said cutting edged that are exposed, to minimize the tendency for skin to extrude between successive cutting edges during a shaving operation.

22. A razor cartridge as defined by claim 18 further comprising:
a second cover coupled to said first cover; and wherein
said razor blade platform is located between said first and second covers.

23. A razor cartridge as defined by claim 22, wherein said second cover defines at least one aperture to allow shaving debris to be washed therethrough during a shaving operation.

24. A razor cartridge as defined by claim 18 wherein:
said projections are stepped and include an abutment surface
extending between successive support surfaces; and wherein each of said razor blades define a rear surface approximately opposite and approximately parallel to
5 said cutting edge; and
said rear surface engages said abutment surface thereby aligning each razor blade relative to the next successive razor blade and to said blade platform.

25. A razor cartridge as defined by claim 18 wherein:
each of said razor blades are adhered to at least one of said support surfaces.

26. A razor cartridge as defined by claim 18 wherein:
said blade platform having said razor blades coupled thereto is movable relative to said first cover; and wherein said razor cartridge further includes
5 biasing means for urging said blade platform toward said opening in response to an externally applied force.

27. A razor cartridge as defined by claim 26 wherein said biasing means is a spring in engagement with at least one of said first and second covers and in biasing communication with said blade platform.

28. A method for loading razor blades into a blade platform for use in a razor cartridge, said method comprising:

providing a blade platform defining at least two support surfaces each adapted to carry a portion of a razor blade, said support surfaces being spaced
5 apart from, offset, and approximately parallel to one another;

providing a blade support defining at least two mating support surfaces positioned to be approximately coincident with said support surfaces defined by said blade platform when said blade platform and said blade support are moved into proximity with one another, said blade support including means for
10 releasably retaining at least two razor blades;

releasably mounting at least two razor blades to said blade support;

moving said blade support into proximity with said blade platform so that a portion of said razor blades releasably mounted to said blade support, engage said support surfaces defined by said razor blade platform;

15 adhering said razor blades to said razor blade platform; and

moving at least one of said blade support and said razor blade platform away from the other of said blade support and said razor blade platform so that said razor blades remain adhered to said razor blade platform.

29. A method as defined by claim 28 wherein:

said blade platform includes at least two abutment surfaces, each adjacent to one of said support surfaces for establishing alignment of said razor blades carried by said support surfaces;

5 said step of releasably mounting at least two razor blades to said blade support includes frictionally retaining each razor blade adjacent at least a portion of a cutting edge defined thereby so that a rear edge generally opposite said cutting edge is exposed; and wherein

said step of moving said blade support further includes causing said
10 rear edge of each razor blade to engage one of said abutment surfaces.

30. A method as defined by claim 28 wherein:
prior to said step of moving said blade support, said method includes the further step of placing adhesive onto at least a portion of each of said razor blades;
- 5 said step of moving said blade support further includes causing said adhesive placed on said razor blades to contact said support surfaces defined by said razor blade platform; and wherein
- said step of adhering further includes at least partially curing said adhesive located between said razor blades and said support surfaces.

1/4

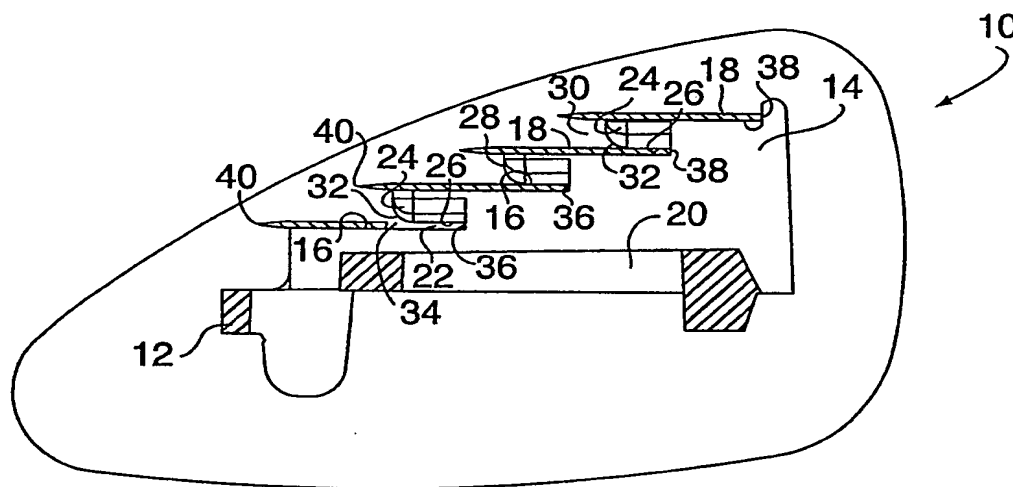
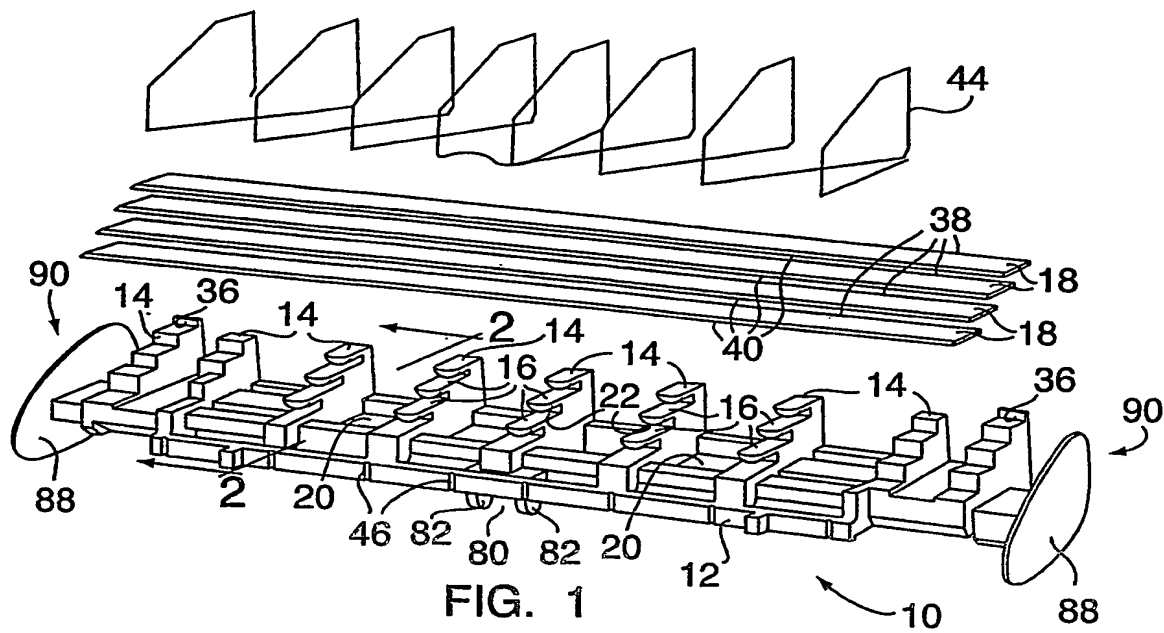


FIG. 2

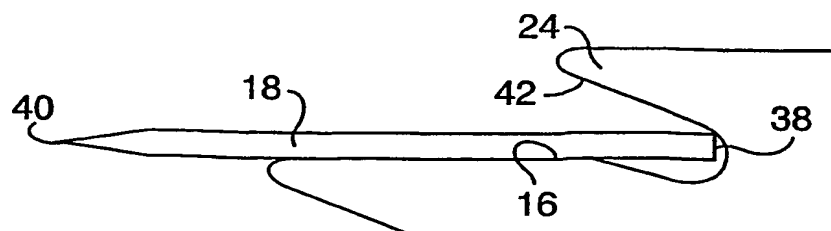
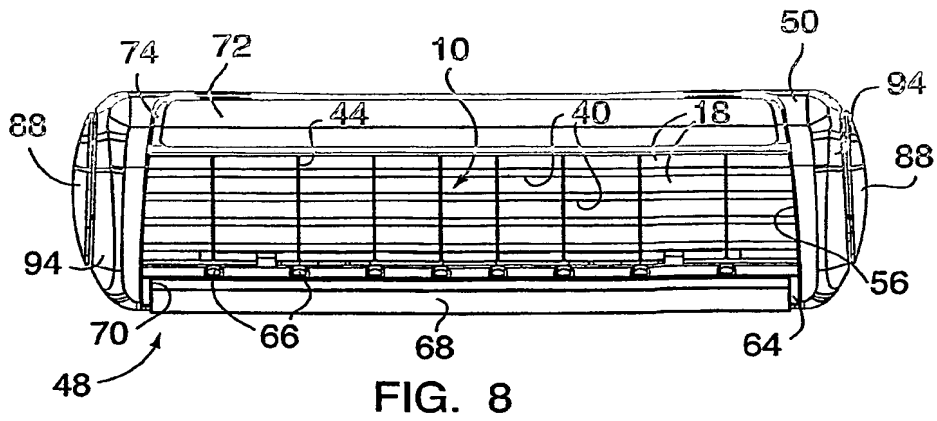
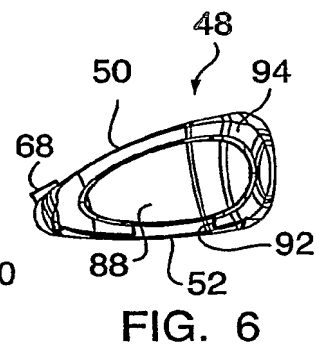
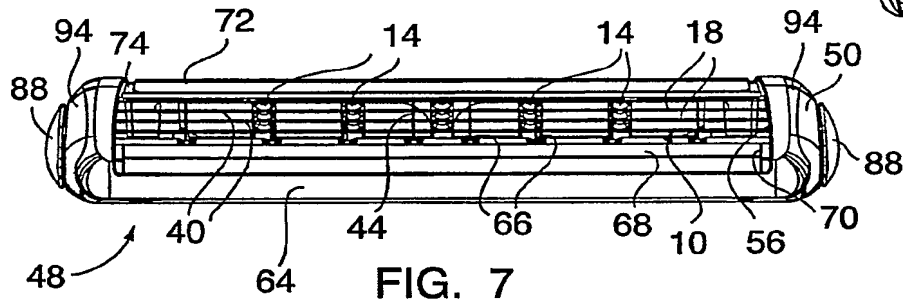
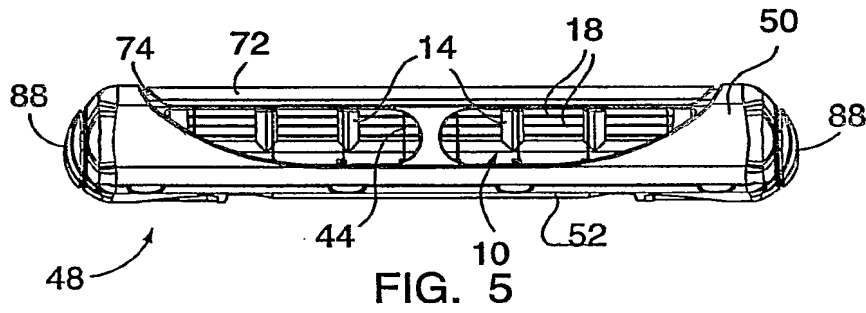
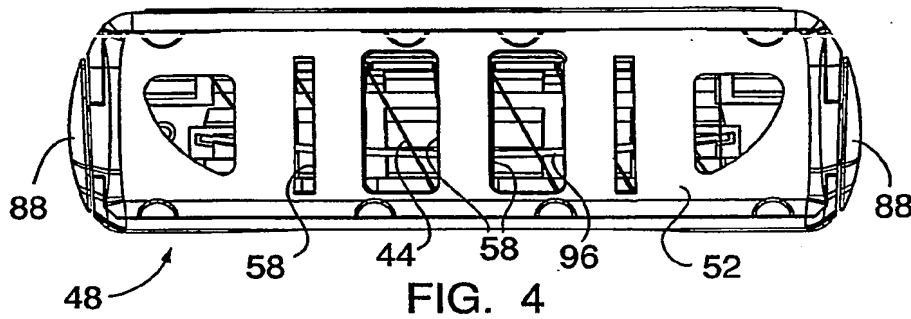
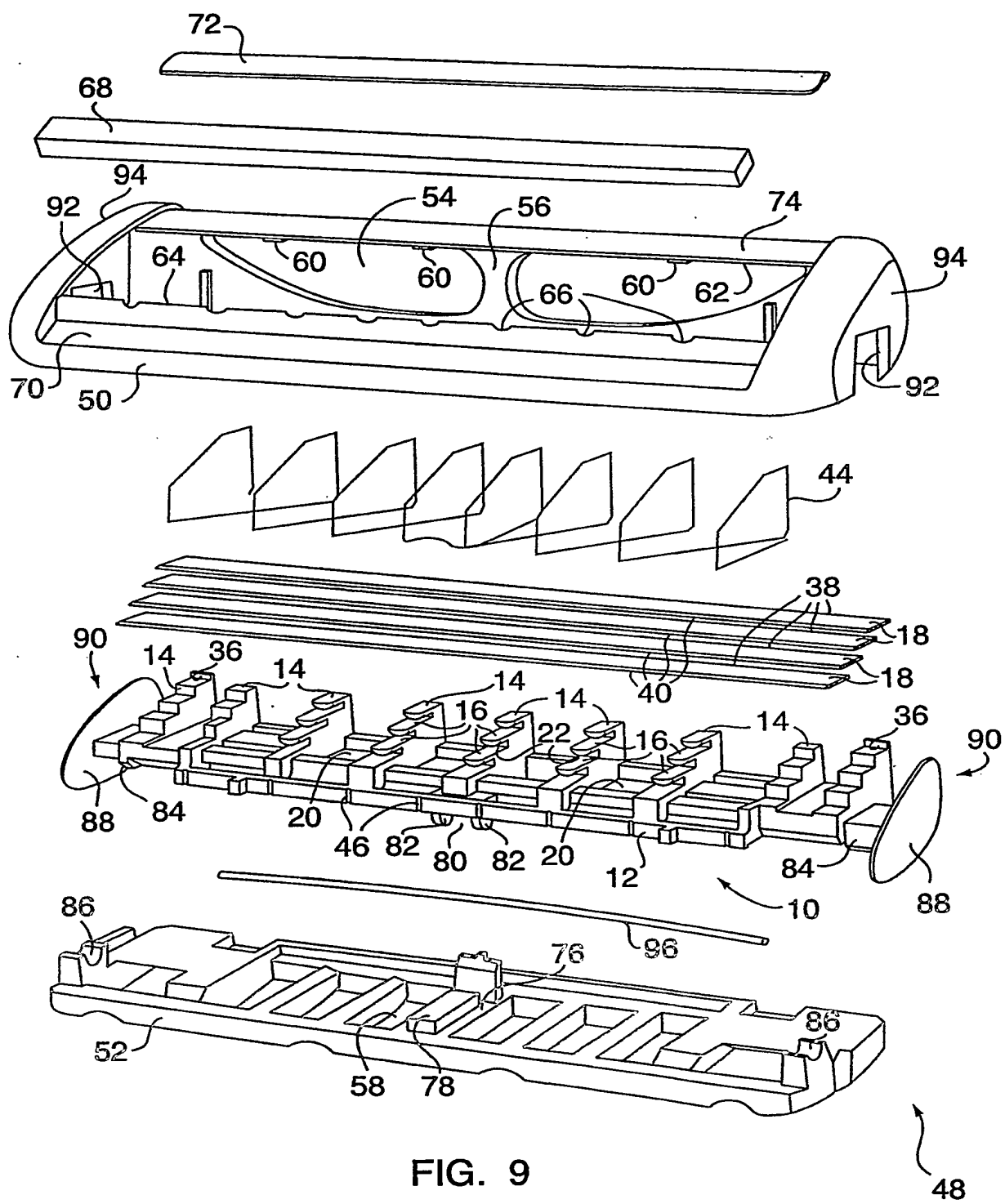


FIG. 3

2/4



3/4



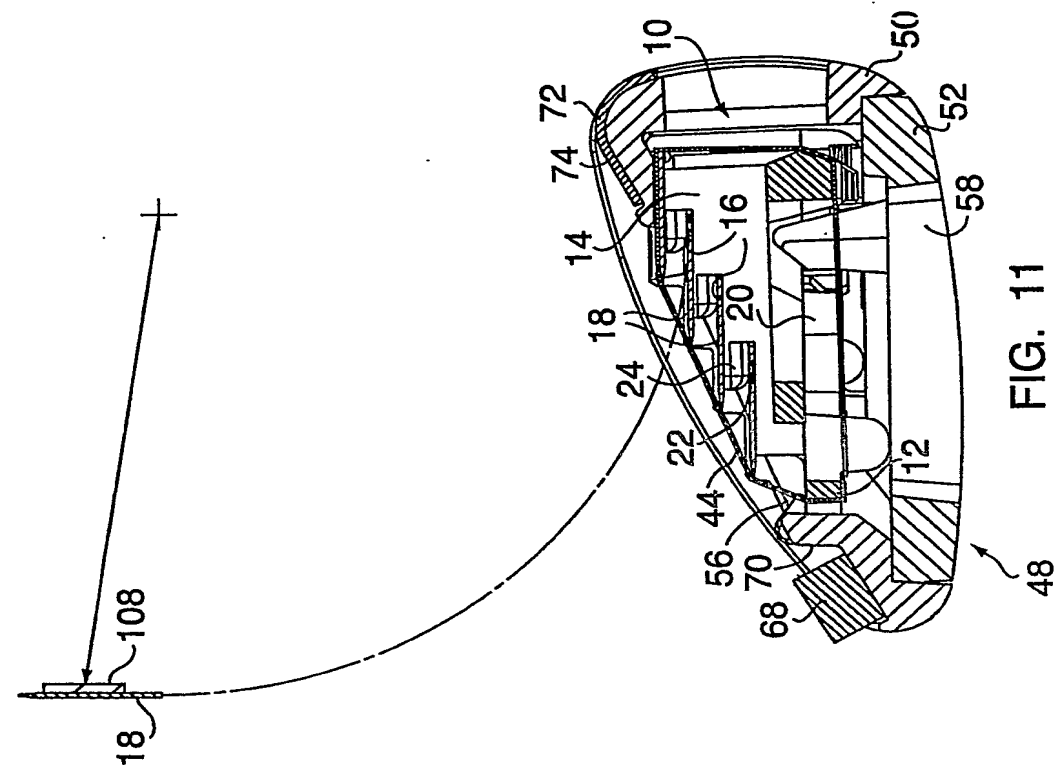


FIG. 11

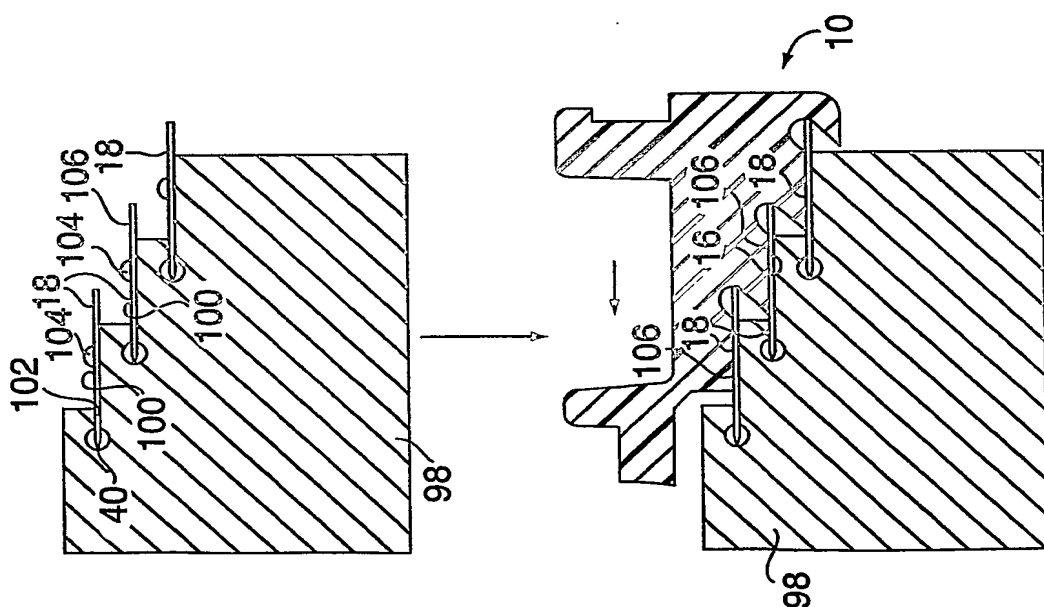


FIG. 10

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/002192

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B26B21/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B26B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01/39937 A (KONINKL PHILIPS ELECTRONICS NV) 7 June 2001 (2001-06-07) page 5, line 9 -page 9, line 34; figure 5 ---	1-10, 15-20, 22-24, 26,27
X A	US 2001/029669 A1 (FERRARO FRANK ET AL) 18 October 2001 (2001-10-18) paragraph '0020! - paragraph '0034!; figures 1-6 ---	1-10,15, 16 24
X	EP 1 245 351 A (WARNER LAMBERT CO) 2 October 2002 (2002-10-02) paragraph '0035! - paragraph '0037!; figures 1,2 --- -/--	1-10,15, 16

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the International filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

16 June 2004

Date of mailing of the international search report

30/06/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

Maier, M

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US2004/002192

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 305 084 B1 (ZUCKER SHLOMO) 23 October 2001 (2001-10-23) column 3, line 65 -column 6, line 31	1,18
A	column 6, line 32 -column 7, line 13; figures 13-18	28
A	US 5 253 420 A (ALTHAUS WOLFGANG ET AL) 19 October 1993 (1993-10-19) the whole document	18,26
A	US 5 365 665 A (COFFIN DAVE) 22 November 1994 (1994-11-22) the whole document	18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2004/002192

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0139937	A	07-06-2001	AT 235354 T CN 1337899 T DE 60001815 D1 DE 60001815 T2 WO 0139937 A1 EP 1163089 A1 ES 2192546 T3 JP 2003515401 T US 6671961 B1	15-04-2003 27-02-2002 30-04-2003 04-12-2003 07-06-2001 19-12-2001 16-10-2003 07-05-2003 06-01-2004
US 2001029669	A1	18-10-2001	US 2003046819 A1 AU 2236000 A CA 2301468 A1 DE 60003486 D1 DE 60003486 T2 EP 1046475 A1 JP 2000308770 A	13-03-2003 26-10-2000 21-10-2000 31-07-2003 13-05-2004 25-10-2000 07-11-2000
EP 1245351	A	02-10-2002	US 2002138992 A1 AU 2765402 A CA 2378902 A1 EP 1245351 A1 JP 2002325985 A	03-10-2002 03-10-2002 28-09-2002 02-10-2002 12-11-2002
US 6305084	B1	23-10-2001	AU 3835601 A BR 0108945 A CA 2401404 A1 CN 1129511 B EP 1263555 A1 HU 0300096 A2 JP 2003525669 T MA 25722 A1 NO 20023696 A NZ 520247 A WO 0164403 A1 ZA 200206171 A	12-09-2001 09-12-2003 07-09-2001 03-12-2003 11-12-2002 28-05-2003 02-09-2003 01-04-2003 28-10-2002 28-02-2003 07-09-2001 03-12-2002
US 5253420	A	19-10-1993	DE 9108213 U1 AT 144453 T BR 9202598 A DE 59207407 D1 EP 0521293 A1 ES 2093139 T3 GR 3021458 T3 JP 3420780 B2 JP 5184740 A JP 2003220285 A RU 2083300 C1	29-10-1992 15-11-1996 16-03-1993 28-11-1996 07-01-1993 16-12-1996 31-01-1997 30-06-2003 27-07-1993 05-08-2003 10-07-1997
US 5365665	A	22-11-1994	GB 2264888 A DE 4303865 A1 DE 9210045 U1 FR 2688158 A1	15-09-1993 16-09-1993 01-10-1992 10-09-1993

THIS PAGE BLANK (USPTO)